AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) An optical sampling method for monitoring repeatedly entered high speed signal lights, comprising the steps of:

generating optical pulses with an optical pulse width shorter than an inverse of a frequency variation of the signal lights, which has a period slightly different from a repetition period of the signal lights, from an optical pulse generation unit;

splitting each of the signal lights and the optical pulses into two parts by respective splitters;

delaying a split part of either the signal lights or the optical pulses for a prescribed period of time by a delay unit;

inputting one split ~~parts~~ part of the signal lights and one split part of the optical pulses into a first optical hybrid, while inputting the delayed split part of the signal lights or the optical pulses and the other split ~~parts~~ part of either the signal lights ~~and~~ or the optical pulses whichever was not delayed into a second optical hybrid;

receiving output lights from the first optical hybrid at first and second balanced optical receivers, and outputting first and second currents;

receiving output lights from the second optical hybrid at third and fourth balanced optical receivers, and outputting ~~this~~ third and fourth currents; and

obtaining a frequency modulation component of the signal lights by ~~carrying out a~~ calculation processing ~~with respect to~~ using values of the first to fourth currents by a calculation processing device.

2. (Currently amended) The optical sampling method of claim 1, wherein at the obtaining step, the calculation processing device carries out the calculation processing such that waveforms of the first to fourth currents are ~~applied with a waveform equalization~~ equalized by being ~~low pass~~ filtered through first to fourth low pass filters, ~~converting~~ first to fourth output currents of the first to fourth low pass filters are converted into numerical values by ~~a~~ numerical value deriving units, and the calculation processing is carried out by using ~~first to fourth current~~ the values obtained by the numerical value deriving units.

3. (Currently amended) The optical sampling method of claim 1, wherein ~~at the obtaining step,~~ when the first to fourth output currents from the first to fourth balanced optical receivers are I_1 (τ), I_2 (τ), I_3 (τ) and I_4 (τ), the calculation processing device carries out the calculation processing in which the second output current I_2 (τ) is divided by the first output current I_1 (τ), the fourth output current I_4 (τ) is divided by the third output current I_3 (τ) , and the frequency modulation component of the signal lights is calculated according to two divided values, under a first condition that an intensity of the signal lights hardly changes during a time period of the optical pulse width of the optical pulses, a second condition that a frequency of the signal lights hardly changes during ~~a~~ the time period of the optical pulse width of the optical pulses, and a third condition that a central frequency of the optical pulses nearly coincides with a central frequency of the signal lights.

4. (Original) The optical sampling method of claim 3, wherein at the obtaining step, the calculation processing device calculates the frequency modulation component ω_M (τ) at a time τ by:

$$\omega_M(\tau) = \{\arctan(I_4(\tau)/I_3(\tau)) - \arctan(I_2(\tau)/I_1(\tau))\}/T$$

where T is a time difference given by the delay unit.

5. (Currently amended) An optical sampling system for monitoring repeatedly entered high speed signal lights, comprising:

an optical pulse generation unit configured to generate optical pulses with an optical pulse width shorter than an inverse of a frequency variation of the signal lights, which has a period slightly different from a repetition period of the signal lights;

splitters configured to split each of the signal lights and the optical pulses into two parts;

a delay unit configured to delay a split part of either the signal lights or the optical pulses for a prescribed period of time;

a first optical hybrid configured to have one split ~~parts~~ part of the signal lights and one split part of the optical pulses inputted therein;

a second optical hybrid configured to have the delayed split part of the signal lights or the optical pulses and the other split ~~parts~~ part of either the signal lights ~~and~~ or the optical pulses whichever was not delayed inputted therein;

first and second balanced optical receivers configured to receive output lights from the first optical hybrid, and output first and second currents;

third and fourth balanced optical receivers configured to receive output lights from the second optical hybrid, and output ~~this~~ third and fourth currents; and

a calculation processing device configured to obtain a frequency modulation component of the signal lights by ~~carrying out a~~ calculation processing ~~with respect to~~ using values of the first to fourth currents.

6. (Currently amended) The optical sampling system of claim 5, wherein the calculation processing device carries out the calculation processing such that waveforms of the first to fourth currents are ~~applied with a waveform equalization~~ equalized by being ~~low pass~~ filtered through first to fourth low pass filters, ~~converting~~ first to fourth output currents of the first to fourth low pass filters are converted into numerical values by ~~a~~ numerical value deriving units, and the calculation processing is carried out by using first to fourth current values obtained by the numerical value deriving units.

7. (Currently amended) The optical sampling system of claim 5, wherein when the first to fourth output currents from the first to fourth balanced optical receivers are $I_1(\tau)$, $I_2(\tau)$, $I_3(\tau)$ and $I_4(\tau)$, the calculation processing device carries out the calculation processing in which the second output current $I_2(\tau)$ is divided by the first output current $I_1(\tau)$, the fourth output current $I_4(\tau)$ is divided by the third output current $I_3(\tau)$, and the frequency modulation component of the signal lights is calculated according to two divided values, under a first condition that an intensity of the signal lights hardly changes during a time period of the optical pulse width of the optical pulses, a second condition that a frequency of the signal lights hardly changes during ~~a~~ the time period of the optical pulse width of the optical pulses, and a third condition that a central frequency of the optical pulses nearly coincides with a central frequency of the signal lights.

8. (Original) The optical sampling system of claim 7, wherein the calculation processing device calculates the frequency modulation component $\omega_M(\tau)$ at a time τ by:

$$\omega_M(\tau) = \{\arctan(I_4(\tau)/I_3(\tau)) - \arctan(I_2(\tau)/I_1(\tau))\}/T$$

where T is a time difference given by the delay unit.

9. (Currently amended) A computer program product for causing a computer to function as a calculation processing device for obtaining a frequency modulation component of signal lights in an optical sampling system for monitoring repeatedly entered high speed signal lights, formed by: an optical pulse generation unit configured to generate optical pulses with an optical pulse width shorter than an inverse of a frequency variation of the signal lights, which has a period slightly different from a repetition period of the signal lights; splitters configured to split each of the signal lights and the optical pulses into two parts; a delay unit configured to delay a split part of either the signal lights or the optical pulses for a prescribed period of time; a first optical hybrid configured to have one split ~~parts~~ part of the signal lights and one split part of the optical pulses inputted therein; a second optical hybrid configured to have the delayed split part of the signal lights or the optical pulses and the other split ~~parts~~ part of either the signal lights ~~and~~ or the optical pulses whichever was not delayed inputted therein; first and second balanced optical receivers configured to receive output lights from the first optical hybrid, and output first and second currents; third and fourth balanced optical receivers configured to receive output lights from the second optical hybrid, and output ~~this~~ third and fourth currents; the computer program product comprising:

a computer program code for causing the computer to obtain a frequency modulation component of the signal lights by ~~carrying out a~~ calculation processing ~~with respect to~~ using values of the first to fourth currents.

10. (Currently amended) The computer program product of claim 9, wherein the computer program code causes the computer to carry out the calculation processing such that waveforms of the first to fourth currents are ~~applied with a waveform equalization~~ equalized by being ~~low pass~~ filtered through first to fourth low pass filters, ~~converting~~ first to fourth output currents of the first to fourth low pass filters are converted into numerical values by ~~a~~ numerical value deriving units, and the calculation processing is carried out by using ~~first to fourth current~~ the values obtained by the numerical value deriving units.

11. (Currently amended) The computer program product of claim 9, wherein when the first to fourth output currents from the first to fourth balanced optical receivers are $I_1(\tau)$, $I_2(\tau)$, $I_3(\tau)$ and $I_4(\tau)$, the computer program code causes the computer to carry out the calculation processing in which the second output current $I_2(\tau)$ is divided by the first output current $I_1(\tau)$, the fourth output current $I_4(\tau)$ is divided by the third output current $I_3(\tau)$, and the frequency modulation component of the signal lights is calculated according to two divided values, under a first condition that an intensity of the signal lights hardly changes during a time period of the optical pulse width of the optical pulses, a second condition that a frequency of the signal lights hardly changes during ~~a~~ the time period of the optical pulse width of the optical pulses, and a third condition that a central frequency of the optical pulses nearly coincides with a central frequency of the signal lights.

12. (Original) The computer program product of claim 11, wherein the computer program code causes the computer to calculate the frequency modulation component $\omega_M(\tau)$ at a time τ by:

$$\omega_M(\tau) = \{\arctan(I_4(\tau)/I_3(\tau)) - \arctan(I_2(\tau)/I_1(\tau))\}/T$$

where T is a time difference given by the delay unit.